

13. (Amended) [An etching solution as in claim 12] The slurry solution of claim 12, wherein said abrasive particles are coated.
14. (Amended) [An etching solution as in claim 13] The slurry solution of claim 13, wherein said coating is a chemically active species.
15. (Amended) [An etching solution as in claim 12] The slurry solution of claim 12, wherein said coating is  $\text{CeO}_2$ .
16. (Amended) [An etching solution as in claim 12] The slurry solution of claim 12, wherein said particles are produced by the sol method.
17. (Amended) [An etching solution as in claim 12] The slurry solution of claim 12, wherein said particles have a range of sizes from approximately 4 nanometers to approximately 5 micrometers.
18. (Amended) [An etching solution as in claim 12] The slurry solution of claim 12, wherein said particles have a size less than approximately 5 micrometers.
19. (Amended) A method of accomplishing chemical mechanical planarization of a Cu/Ta/TaN surface comprising:  
providing [an etching] single-step slurry solution including a combination selected from the group consisting of (i)  $\text{H}_2\text{O}_2$  with  $\text{H}_3\text{PO}_4$ ,  $\text{H}_2\text{SO}_4$ ,  $\text{HNO}_3$ , oxalic acid, acetic acid, or organic acid, (ii)  $\text{HNO}_3$  with  $\text{H}_3\text{PO}_4$ , or  $\text{H}_2\text{SO}_4$ ; and (iii) an oxidizing reagent with HF;  
applying the solution to the surface; and  
planarizing both the Cu and at least one of the Ta and TaN during a single processing step.

20. (Amended) The method of claim 19, wherein the [etching] slurry solution is selected from the group consisting of  $\text{H}_2\text{O}_2$  with  $\text{H}_3\text{PO}_4$ ,  $\text{H}_2\text{SO}_4$ ,  $\text{HNO}_3$ , oxalic acid, or organic acid.
21. (Amended) The method of claim 19, wherein the [etching] slurry solution is selected from the group consisting of  $\text{HNO}_3$  with  $\text{H}_3\text{PO}_4$ , or  $\text{H}_2\text{SO}_4$ .
22. (Amended) The method of claim 19, wherein the [etching] slurry solution is selected from the group consisting of an oxidizing reagent with HF.
23. (Amended) The method of claim 19, further including in the [etching] slurry solution an additive selected from the group consisting of selected from the group consisting of HCl, aliphatic alcohols, butylated hydroxytoluene, Agidol-2,2,6-di-tert-butyl-4[(dimethylamino)methyl]phenol, 2,6-di-tert-4N,N-dimethylaminomethylphenol, borax, ethylene glycol,  $\text{ZnSO}_4$ , methanol, propanol, poly(oxyethylene)lauryl ether, malic acid,  $\text{HOOC}(\text{CX}_2)_n\text{COOH}$  wherein  $\text{X}=\text{OH}$ , amine, H and  $n=1-4$ ), 3% tartaric acid, 1% ethylene glycol, 1,2,4-triazole, 1,2,3-triazole, tetrazole, nonionic surfactant, ethanol, trifluoroethanol,  $\text{SiF}_6$ , organic salt surfactant, polyvinyl alcohol, diphenylsulfamic acid, sodium oxalate, bezotriazole, sodium lignosulfonate, glycol, gelatin carboxymethylcellulose, amines, heavy metal salts, salts of Cu and Ta, KCl,  $\text{CuCl}_2$ ,  $\text{SnCl}_2$ , propylene glycol, 2-ethyl-hexylamine, copper carbonate, low molecular weight alcohols, glycols, phenols, aliphatic alcohols, polyvinylalcohols, anionic surfactants, cationic surfactants, fluorocarbon-based surfactants, nonionic surfactants having the properties of preferentially adhering to certain materials, modifying thereby the chemical reactivity where so adhered, polyvinyl alcohol solution stabilizers and species inhibiting spontaneous decomposition of oxidizing agents, wetting agents and mixtures thereof.
24. (Amended) The method of claim 19, further including in the [etching] slurry solution at least one of CuCl, FeCl, and  $\text{FeCl}_3$ , in the [etching] slurry solution.

25. (Amended) The method of claim 19, further including in the [etching] slurry solution at least one of  $\text{Cu}(\text{NO}_3)_2$ ,  $\text{CuSO}_4$ , EDTA,  $\text{FeNO}_3$ , KOH,  $\text{K}_2\text{S}_2\text{O}_5$ ,  $(\text{NH}_4)_2\text{S}_2\text{O}_8$ ,  $\text{CuNH}_4\text{Cl}_3$ , NaOH,  $\text{NaClO}_3$ ,  $\text{NaNO}_3$ ,  $\text{Na}_2\text{S}_2\text{O}_8$ ,  $\text{NH}_4\text{F}$ , and  $\text{NH}_4\text{OH}$  and in the [etching] slurry solution.
26. (Amended) The method of claim 19, further including in the [etching] slurry solution at least one of a molybdenum salt and phenolsulfonic acid in the [etching] slurry solution.
29. (Amended) The [etching] slurry solution of claim 1 comprising  $\text{H}_2\text{O}_2$ .
30. (Amended) The [etching] slurry solution of claim 1 comprising  $\text{H}_3\text{PO}_4$ .
31. (Amended) The [etching] slurry solution of claim 1 comprising  $\text{H}_2\text{SO}_4$ .
32. (Amended) The [etching] slurry solution of claim 1 comprising  $\text{HNO}_3$ .
33. (Amended) The [etching] slurry solution of claim 1 comprising an organic acid.

## **REMARKS**

### **The Kaufman Patent (US 6063306)**

The claims of the present application are not anticipated and are also patentable in light of and over Kaufmann, as based on the following arguments, among others.

Claim 1 recites:

“A chemical mechanical planarization system that **includes a Cu/Ta/TaN surface, a single-step slurry solution** comprising:

- a) an oxidizing reactant selected from the group consisting of  $\text{H}_2\text{O}_2$ ,  $\text{HNO}_3$  and mixtures thereof; and
- b) a co-reactant is selected from the group consisting of  $\text{H}_3\text{PO}_4$ ,  $\text{H}_2\text{SO}_4$ ,  $\text{HNO}_3$ , oxalic acid, acetic acid, organic acids and mixtures thereof.”